

Algebra 2 Honors
Exponents Test 2015 – 2016 RE-TEST

60

Name: _____
Date: _____

For problems #1 – 5, simplify the expression. No negative exponents should be remaining. All denominators should be rationalized. (3pts. each)

1. $(x^2 \cdot x^t)^5$
 x^{10+5t}

2. $\left(\frac{a^{\frac{1}{3}} b^6}{c^{-4}} \right)^{-3}$
 $\left(\frac{a^{-1} b^{-18}}{c^{12}} \right)$

$$\boxed{\frac{1}{a b^{18} c^{12}}}$$

3. $\sqrt[3]{\frac{4x^8}{24x^{12}}}$

$$\sqrt[3]{\frac{1}{6x^4}} \cdot \sqrt[3]{\frac{36x^2}{36x^2}}$$

$$\boxed{\frac{\sqrt[3]{36x^2}}{6x^2}}$$

4. $\left(\frac{16}{625}\right)^{\frac{-3}{4}}$

$\left(\sqrt[4]{\frac{625}{16}}\right)^3$

$\frac{125}{8} = 15.625$

5. $\frac{x^{\frac{3}{4}}}{x^{\frac{1}{3}}}$

$\frac{3}{4} - \frac{1}{3}$

$\frac{9}{12} - \frac{4}{12}$

$\frac{5}{12}$

$x^{\frac{5}{12}}$

6. Which function displays the fastest growth as the x-values continue to increase? (2pts)

x	-2	-1	0	1	2	
f(x)	-4	-2	0	2	4	x^2
g(x)	9	6	5	6	9	quadratic
h(x)	-18	-11	-10	-9	-2	x^7
d(x)	0.25	0.5	1	2	4	x^2

(a) f(x)

b) g(x)

c) h(x)

(d) d(x)

Without graphing, identify if the following functions represent **exponential growth** or **exponential decay**. (2pts each)

7. $f(x) = 5^x$

growth

8. $f(x) = 1.5^{-x}$

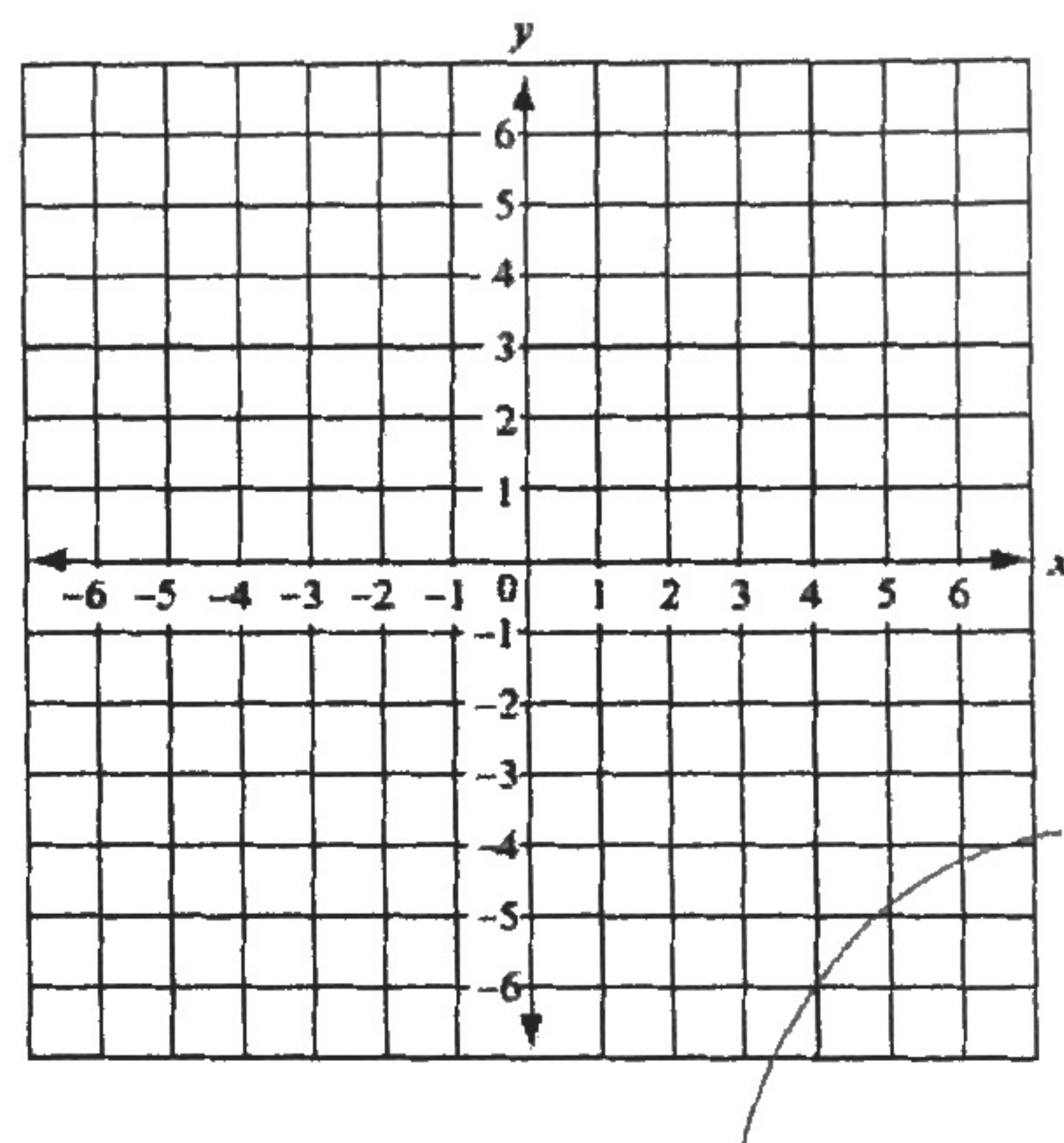
decay

9. $f(x) = 0.75\left(\frac{5}{3}\right)^x$

growth

10. Complete the table for $f(x) = -3\left(\frac{1}{2}\right)^{x-3} - 4$. Then graph the function below. (3pts)

x	$f(x)$
-2	-100
-1	-52
0	-28
1	-16
2	-10



11. Identify the domain and range of the exponential function $f(x) = -3\left(\frac{1}{2}\right)^{x-3} - 4$. (2pts)

$D: (-\infty, \infty)$

$R: (-4, -\infty)$

12. Compare the graph of the parent function, $f(x) = \left(\frac{1}{2}\right)^x$, to the graph of $g(x) = -3\left(\frac{1}{2}\right)^{x-3} - 4$. Describe how the graph has shifted. (3pts)

flipped over x-axis
stretched by factor of 3
right 3
down 4

13. Rewrite $f(x) = -3\left(\frac{1}{2}\right)^{x-3} - 4$ so that it contains only two transformations of the function $f(x) = \left(\frac{1}{2}\right)^x$. (3pts)

$$f(x) = -3\left(\frac{1}{2}\right)^x \left(\frac{1}{2}\right)^{-3} - 4$$

$$f(x) = -3\left(\frac{1}{2}\right)^x (8) - 4$$

$$f(x) = -24\left(\frac{1}{2}\right)^x - 4$$

14. A car is purchased for \$30,000. The value of the car depreciates annually so that it is \$24,000 after 1 year; \$19,200 after 2 years; and \$15,360 after 3 years. Write a function to model the value of this car after y years. (3pts)

$$V = 30,000(0.8)^x$$

16. Which situation represents exponential growth over time? (3pts)

- a) The number of ants in a population that increases by 1,000 ants each day.
- b) The temperature of a glass of water that increases by 10 degrees every half hour until it reaches room temperature.
- ☒ c) The number of people who go to a play if each person who sees the play returns the next evening and brings 2 friends.
- d) The size of a population of bacteria that increases by 1,000 in the first hour, then by 1,000 during the next two hours, then by 1,000 during the next 4 hours, and continues to grow according to the same pattern.

Solve for x in problems 16 – 20. (4pts each)

16. $\sqrt{56-x} = x$

$$56 - x = x^2$$

$$x^2 + x - 56 = 0$$

$$(x+8)(x-7) = 0$$

$$\boxed{x = -8, 7}$$

17. $x^{\frac{3}{2}} = \frac{1}{729}$

$$\left(x^{\frac{3}{2}}\right)^{-\frac{2}{3}} = \left(\frac{1}{729}\right)^{-\frac{2}{3}}$$

$$x = 729^{\frac{2}{3}}$$

$$\boxed{x = 81}$$

18. $(\sqrt{10-x} + 2)^2 = (\sqrt{3x-2})^2$

$$(\sqrt{10-x} + 2)(\sqrt{10-x} + 2) = 3x - 2$$

$$10 - x + 4\sqrt{10-x} + 4 = 3x - 2$$

$$14 - x + 4\sqrt{10-x} = 3x - 2$$

$$4\sqrt{10-x} = 4x - 16$$

$$(\sqrt{10-x})^2 = (x-4)^2$$

$$10 - x = x^2 - 8x + 16$$

$$0 = x^2 - 7x + 6$$

$$0 = (x-6)(x-1)$$

$$\boxed{x = 6, 1}$$

$$19. \sqrt{\sqrt{37-3x}} = \sqrt{x-3}$$

$$(\sqrt{37-3x})^2 = (x-3)^2$$

$$37-3x = x^2-6x+9$$

$$0 = x^2-3x-28$$

$$0 = (x-7)(x+4)$$

$$\boxed{x = 7, -4}$$

$$20. (64)(16^{-3x}) = 16^{3x-2}$$

$$(4^3)(4^2)^{-3x} = (4^2)^{3x-2}$$

$$(4^3)(4^{-6x}) = 4^{6x-4}$$

$$4^{3-6x} = 4^{6x-4}$$

$$3-6x = 6x-4$$

$$7 = 12x$$

$$\boxed{\frac{7}{12} = x}$$